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Examining the Role of MPAs in Ecosystem-Based Management, and Vice Versa: Five Examples

In the marine realm, the rising popularity in recent years of the concept of *ecosystem-based management* — or, alternatively, *ecosystem approaches to management* — has been swift, with management organizations at multiple levels endorsing it worldwide. The concept involves applying a holistic approach to resource management rather than focusing on a single species or sector. The fundamental idea is simple: because the elements of an ecosystem are interconnected (including species, habitats, and the range of system services they provide to humans), it makes sense to manage them as a whole rather than as a series of disconnected parts. With the global decline of many fish stocks and ocean health in general, managers are eager to implement a concept that promises a sustainable way forward.

Like the workings of an ecosystem, however, the implementation of ecosystem-based management (EBM) can be deceptively complex. The condition of ocean ecosystems can be affected not only by what is in the water but what is in the air and on nearby land, too. Effective EBM of an inshore coral reef ecosystem, for example, can require reductions in land-based pollution and runoff from coastal communities. Ultimately, it can also require addressing the threat of global climate change to that ecosystem.

The need to manage such complexity is already familiar to many managers of marine protected areas. Indeed, there is some overlap between the concepts of MPAs and marine ecosystem management. MPAs are widely designated with the intent of protecting an ecosystem and providing direct or indirect ecosystem services to humans, such as through fishing or tourism. These goals are common to EBM as well. In fact, the range of definitions for EBM (see box on page 2, "Defining marine ecosystem management") could be viewed as encompassing most types of MPA, from no-take marine reserves to multiple-use areas.

From this overlap, a growing number of practitioners worldwide are familiar both with MPAs and EBM. This month, *MPA News* discusses with these experts how the two concepts can fit together in various ways.

Thinking beyond the "traditional" approach of individual MPAs: Bird's Head Seascape, Indonesia

In September 2006, the international news media announced that a pair of research expeditions in waters of northwest Papua, Indonesia, had discovered 52 new species of fish, coral, and shrimp, including two species of shark that appeared to walk on their fins on the seafloor. The expeditions were to the Bird's Head Seascape, an area of 180,000 km^2 and more than 2500 islands and submerged reefs. It is the epicenter of the so-called "Coral Triangle" region in the Western Pacific, with the highest coral reef biodiversity for its size of any area in the world.

The surveys were part of a major EBM initiative funded by the David and Lucile Packard Foundation and implemented by three conservation NGOs (Conservation International, The Nature Conservancy, and WWF-Indonesia) in association with Indonesian organizations, academics, national agencies, and 14 local (regency) governments in the region. The goal of the Seascape Initiative is to explore the ecological, socioeconomic, and governmental processes that are critical to managing resources in the Bird's Head region, and to develop a comprehensive EBM plan for the coastal and marine resources of the seascape. Fifteen separate studies are underway within the project — including satellite tagging of turtles, research on sustainable development options, economic valuation of resources, and more.

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MPA News Reader Poll: The relationship between MPAs and ecosystem-based management

With the emerging trend toward applying an "ecosystem approach" to marine resource management, what role should MPAs play in it?

MPA News would like your opinion. Please take our quick poll on MPAs and ecosystem-based management at the *MPA News* website:

www.mpanews.org

One respondent will be picked at random to receive an official *MPA News* canvas tote bag. Thank you.

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In news reports on the surveys, expedition leader Mark Erdmann was quoted as calling for designation of MPAs to protect some of the noteworthy sites encountered by the research team. He says, however, that the overall EBM project is about much more than simply MPAs.

"Each of our organizations has come to the realization that in order to most effectively deal with the global threats of overfishing and biodiversity loss in the oceans, we must not only work much more closely together as conservation partners, but also scale up our approach to tackle large-scale marine conservation," says Erdmann, who represents Conservation International on the project management team. "This entails thinking beyond the 'traditional' approach of setting up individual MPAs. Rather, it is about designing full networks of MPAs based on a broader EBM concept. That concept explicitly acknowledges oceanographic and genetic connectivity between MPAs and the important role of ecosystem-level processes that operate at a scale much broader than individual MPAs. By doing this, we also explicitly acknowledge the need for marine management tools that extend beyond 'just' MPAs, including policies to protect watersheds and regulate fisheries in non-MPA areas."

Fisheries in the region are multi-species, multi-gear, and highly decentralized, and access is largely unregulated. In this context, says Erdmann, MPAs remain an essential, even primary, component within an EBM plan. "This underscores the importance of MPAs as a simple yet elegant solution to managing complex tropical nearshore fisheries that are difficult to monitor and control," he says.

Lida Pet-Soede of WWF-Indonesia, who also serves on the project management team, agrees that MPAs need to be part of the regional management system. "MPAs are one of the most important components of EBM at areas critical for the life history of marine organisms," she says, citing examples of MPAs' usefulness in protecting turtle-nesting habitats or tuna-spawning sites. She notes, however, that because such animals migrate, there needs to be some level of threat-reduction for them in waters beyond the MPAs, too. EBM ideally provides that with an umbrella of integrated management measures. "Ecosystem-based management is more encompassing than MPAs, especially as a management tool for sustainable pelagic fisheries and preservation of migratory species populations," she says.

The Fisheries Centre of the University of British Columbia (Canada) is developing a model for the Seascape Initiative that will allow the study of potential management interventions — such as establishment of no-take zones — on multiple ecosystem components. Peter Mous, who represents The Nature Conservancy on the project management team, says the model will enable integration of the results from various studies and evaluate their combined implications for management. "So instead of just evaluating how a no-take area affects the catch of, say, coral trout in adjacent waters, we will also be able to study indirect effects of this measure, such as how increased populations of coral trout could cause greater predation pressure on other species," says Mous.

In working with local stakeholders to implement the initiative, the project team has had to communicate the concept of EBM. In a region where many people may be unfamiliar with the ecological concept of an "ecosystem" and may not be used to formal marine resource management in general, this is not always easy. "Our initial attempts to translate the rather unwieldy definitions of EBM into the Indonesian language were, shall we say, cumbersome," says Erdmann. "However, we have found that by highlighting the 'connectivity' of the oceans, we are able to quickly convince policymakers and marine resource users of the need to manage beyond their traditional administrative boundaries and consider a range of ecological processes that impact their fisheries."

Mous says establishing a few successful MPAs will also help sell the concept of EBM. "Having effective MPAs in place will make the case for the EBM approach in a more tangible way," he says. "With these 'demonstration MPAs', we can then work toward a broader network that provides benefits for fisheries, tourism, and species protection."

Ecosystem-based management of an altered ecosystem: PANGAS Project, Mexico

Similar to how the Seascape Initiative is examining factors essential to management of its region, an interdisciplinary project is underway in the northern Gulf of California (Mexico) to study small-scale fisheries — the region's most prevalent fishing activity and an

Defining marine ecosystem management

For the purpose of this article, MPA News uses the terms *ecosystem management*, *ecosystem-based management*, and *ecosystem approaches to management* interchangeably, although we recognize that arguments exist over which term is most appropriate. The concept does not yet have a globally agreed-upon definition. In March 2005, COMPASS (Communication Partnership for Science and the Sea) issued a statement signed by 200 academic scientists and policy experts in which EBM was defined as follows:

> "Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of [EBM] is to maintain an ecosystem in a healthy, productive, and resilient condition so that it can provide the services humans want and need. [EBM] differs from current approaches that usually focus on a single species, sector, activity, or concern; it considers the cumulative impacts of different sectors." (The full statement is available at *http://compassonline.org/?q=EBM*.)

The IUCN Commission on Ecosystem Management describes the ecosystem approach as such:

> "The ecosystem approach places human needs at the center of biodiversity management. It aims to manage the ecosystem, based on the multiple functions that ecosystems perform and the multiple uses that are made of these functions. The ecosystem approach does not aim for short-term economic gains, but aims to optimize the use of an ecosystem without damaging it." (*http://www.iucn.org/themes/CEM/ourwork/ecapproach/index.html*.)

important economic sector. Called the PANGAS Project (Pesca Artesanal del Norte del Golfo de California), the initiative aims to provide a scientifically sound framework to understand how small-scale fisheries operate within the northern Gulf ecosystem, including the social and biophysical factors that drive their performance. The framework will be shared with the National Commission of Aquaculture and Fisheries (which oversees the region's fisheries) and with local fishery committees and NGOs, with the goal of facilitating ecosystem-based management in the region.

PANGAS involves three universities and two non-profit research and conservation organizations in Mexico and the US. Project Director Richard Cudney-Bueno of the University of Arizona (US) says marine protected areas — and particularly no-take marine reserves — will be necessary to achieve an outcome of ecosystem-based management for the region. "MPAs are practically the only means to assure that ecosystem processes are incorporated into management schemes, since most other tools are species- or habitat-specific," he says. "That said, when the institutional atmosphere is not amicable to their establishment, creating MPAs blindly may render more problems to the ecosystem than before [due to community ill will and lack of compliance]. In these situations, it may be best to rely on a slew of other measures than can approach a holistic view of ecosystem management. Ultimately, the applicability and success of MPAs in EBM will be based on the social, political, and biophysical environment of the ecosystem in question."

Cudney-Bueno emphasizes the importance of having clear baselines and measures of success for management interventions. "Any management intervention — be it a fishing quota, a species-specific season closure, or type of MPA — will likely result in some form of ecosystem change," he says. "This change is not necessarily in tune with what the ecosystem was like prior to significant anthropogenic intervention, assuming we know what the system was like in the first place."

The ecosystem of the northern Gulf of California has changed significantly in the past 100 years. Development of the western United States resulted in the "taming" of the Colorado River, which runs southward from the US into the northern Gulf. Systematic damming and diversion of the river, which began in the 1930s with the Hoover Dam, has drastically reduced the flow, resulting in cases when the river has become in recent years little more than a trickle by the time it has reached the Gulf. (Mexico is partly responsible: much of the Colorado River water that reaches Mexico is diverted to agriculture.) In terms of ecosystem-based management, the question becomes which version of the ecosystem should managers pursue — the pre-dammed ecosystem or simply a healthier version of the present day?

"Unfortunately we don't have a hard data baseline of what the marine ecosystem was like prior to the development of Hoover Dam in the mid-1930s," says Cudney-Bueno. However, he notes, recent studies show strong evidence of the benefits of fresh water flows on various fisheries. In addition, there are several oral histories of the region, both in print and collected from elder fishers. He notes the dramatic differences in ecosystem described by these histories, including a Colorado River delta lush with vegetation, waterfowl, and even jaguars — much of which is no longer there.

"Unquestionably, the region was a very different place back then," he says. "However, the northern Gulf as we came to know it throughout the mid-20th century, even after damming of the river, was an extremely productive body of water supporting vast numbers of large predators and fish-spawning runs reaching the mouth of the river. My view is that we must continue lobbying not only to obtain more water flowing into the Gulf of California, but also in the right pulses and at the right time.

"However, given the political uncertainty to attain this, there is still much we can do to make the northern Gulf a healthier ecosystem even without vast river flows," he says. "The northern Gulf as it is today remains productive and is considered a key marine conservation target for Mexico and the world, although overfishing has undoubtedly taken its toll. Focusing our efforts on an ecosystem that approaches the baseline immediately following river-flow diversions would not be a bad way to go. It is a baseline that fishers' children today can see only in black and white photographs."

Large MPA as model of EBM: Great Barrier Reef Marine Park, Australia

Jon Day, conservation director for the Great Barrier Reef Marine Park Authority (GBRMPA) in Australia, says that ecosystem-based management contrasts with the purely sectoral focus shown by most management approaches. "Most agencies are restricted within ecologically inappropriate boundaries based solely on governance or jurisdiction," says Day.

Unlike the majority of MPAs — which comprise just part of what would be considered a complete ecosystem — the Great Barrier Reef Marine Park covers virtually an entire barrier reef, plus associated habitats ranging from inshore coastal waters to deep ocean. Thus the marine park is expansive enough so that its EBM and MPA management have much in common, including encompassing the connectivity among habitats and the range of biodiversity.

This was exemplified by the Representative Areas Program (RAP), a five-year process by which GBRMPA re-zoned the park to protect biodiversity across the Great Barrier Reef, increasing the extent of no-take areas (to 33%) and ensuring that they included representative examples of each of the park's 70 bioregions (*MPA News* 5:10). A parallel aim of the

Meetings on ecosystem approaches to marine resource management

Marine ecosystem management has been the focus of several recent international meetings, including:

- An official discussion panel at the June 2006 UN Open-ended Informal Consultative Process on Oceans and the Law of the Sea (UNICPOLOS-7, http://www.iisd.ca/vol25/enb2527e.html)
- The September 2006 FAO-sponsored conference *Implementing the Ecosystem Approach to Fisheries* (http://cieaf.imr.no)
- The October 2006 *Third International Tropical Marine Ecosystems Management Symposium* (http://www.itmems.org)

Tools for ecosystem-based management

A new website provides access to an array of software and models for applying coastal and marine ecosystem-based management. The EBM Tools Network (*http://www.ebmtools.org*) offers a searchable database of EBM tools, a portal to information about EBM tools, training and funding opportunities, data sources, relevant meetings and conferences, and other resources. The network is an international alliance of tool developers, practitioners, and training providers for coastal and marine EBM. Network members include the David and Lucile Packard Foundation, Ecotrust, the National Center for Ecological Analysis and Synthesis, the National Oceanic and Atmospheric Administration, The Nature Conservancy, NatureServe, Duke University, the Orton Family Foundation, the Pacific Marine Analysis and Research Association, Princeton University, the Sea Around Us Project, and the University of Queensland.

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effort was to minimize impacts of re-zoning on existing resource users, taking socioeconomic criteria into account. The new zoning plan took effect in July 2004; in November 2004, the state of Queensland "mirrored" the new zoning in virtually all adjoining state waters, so now there are complementary zoning and regulations for virtually all state and federal waters of the reef region. GBRMPA has also worked with the Queensland government to create the Reef Water Quality Protection Plan (RWQPP), which identifies actions to assist in halting and reversing the decline in the quality of water entering the Great Barrier Reef. The focus is on relatively low-cost measures to encourage good planning and assist landholders in adopting best practices that are both profitable and environmentally sustainable. Information on RAP and the RWQPP is available at http://www.gbrmpa.gov.au.

Broad-area integrated management that has been planned properly and managed successfully — such as that enabled by GBRMPA and its partnerships with Queensland — is more effective than a series of small, highly protected MPAs surrounded by a sea of unmanaged activities, says Day. "Ecologically, it recognizes the temporal and spatial scales at which natural systems operate and the connectivity that is fundamental in marine ecosystems, while helping to ensure the health and integrity of the ecosystem as a whole," he says. "Socially, it helps to resolve and manage conflicts in the use of natural resources and ensures that all reasonable uses can occur in various areas while minimizing conflicts. And practically, it can facilitate more effective use of resources, rather than each small, isolated MPA having to maintain its own set of duplicate resources for management."

An article in the 4 August 2006 edition of *Science* journal ("Resolving Mismatches in US Ocean Governance") recommended implementing ecosystem-based management of the oceans via comprehensive ocean zoning, and cited the re-zoning program of the Great Barrier Reef Marine Park as a "striking example" of what this could look like. The article's lead author, Larry Crowder of Duke University (US), acknowledges that GBRMPA already had the legal ability to manage and to zone, as conferred in the park's enabling legislation. Thus, he says, even though the RAP process lasted five years, it was relatively straightforward compared to what broad-scale ocean zoning could involve, with multiple jurisdictional conflicts and a lack of clarity on process. Day agrees.

In the case of an MPA that comprises nearly an entire ecosystem, does this mean that all of its management activities qualify as EBM? Day considers there are many examples of resource management programs in the Great Barrier Reef that are not strictly ecosystem-based but are still effective, having been adaptively managed over the years. In his view, these include numerous formal policies, guidelines, and best-practice approaches for managing activities in the park, such as managing tourism, scientific research, and artificial reef proposals, among others. "All these activities are aimed at ensuring sustainability and are backed up by a number of fundamental management tools including zoning, permits, public education, and compliance," he says.

Major international agreements and EBM: the Wadden Sea Plan, and CCAMLR

EBM principles underlie two international frameworks for the management of specific marine areas: the trilateral Wadden Sea Plan — which guides management of the Wadden Sea in the Netherlands, Denmark, and Germany — and the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).

The Wadden Sea features the world's largest unbroken stretch of tidal flats and salt marshes, and provides critical habitat for dozens of migratory bird species. In 1978, governments of the Netherlands, Denmark, and Germany gathered for the first time to discuss protection of the ecosystem, and four years later declared their intent to coordinate activities for comprehensive protection of the Wadden Sea region. In 1997, the Wadden Sea Plan was adopted, outlining the three countries' common policies, measures, projects, and actions for their joint efforts. The plan is available on the website of the Common Wadden Sea Secretariat (http://www.waddensea-secretariat.org). It applies within the territorial sea (12 nm) of each country.

Although the term "ecosystem-based management" does not appear in the Wadden Sea Plan, fundamental elements of the concept do. There are several references to "coordinated and integrated management of the Wadden Sea Area", and policy statements that apply to activities in adjacent areas. As stated in the plan, "The trilateral conservation policy and management is directed toward achieving the full scale of habitat types which belong to a natural and dynamic Wadden Sea."

Targets for habitat quality, birds, marine mammals, water quality, and other indicators have been established. The nations have also instituted a stakeholder forum — the Wadden Sea Forum — to advance sustainable development in harmony with environmental goals of the conservation area. All told, this could constitute the most comprehensive protection for a coastal area in Europe.

Implementation of the plan so far has included the establishment of no-take zones as well as other types of marine protected area, including German national parks and Danish and Dutch nature reserves. Jens Enemark, Wadden Sea Secretary, says the national parks and nature reserves form the core of the region's conservation area. "From the outset a generation ago, the concept has been that the trilateral protection should cover the entire ecosystem with different levels of regulation, rather than protecting only the highly sensitive parts of the system," he says. "Without this comprehensive protection scheme, management could not have been successful."

The CCAMLR Convention came into force in 1982 as part of the Antarctic Treaty System. Established in response to concerns that an increase in krill catches in the Southern Ocean could have serious impacts on krill levels and species that depend on krill (birds, seals, and fish), CCAMLR now has 24 member states that contribute to the organizational budget and may vote on management decisions. These members are generally also involved in research or fisheries in the region. The Convention makes explicit reference to conservation as its central aim, and directs the application of an ecosystem approach. Article 2 of the Convention states, "The objective […] is the conservation of Antarctic marine living resources. For the purposes of this Convention, the term 'conservation' includes rational use." A precautionary approach has been implemented to minimize risk associated with unsustainable practices in conditions of uncertainty.

In light of the emphasis on conservation for the area, some people consider the CCAMLR area to be, essentially, a large MPA. (Readers may recall that the CCAMLR area tied for most votes in the recent *MPA News* poll to determine the world's largest marine protected area [*MPA News* 8:3].) A CCAMLR Commission, consisting of member states, operates management plans for three fisheries — toothfish, icefish, and krill.

A small number of MPAs have been designated in the Southern Ocean. As described in a letter in our February 2003 edition (*MPA News* 4:7), just one so far has been designated under CCAMLR: a 30-km^2 site in Terra Nova Bay. The remaining MPAs — fewer than 10 in total — were adopted at various Antarctic Treaty meetings, or are seal conservation areas designated under the Convention for the Conservation of Antarctic Seals, a separate agreement from the CCAMLR Convention.

It is possible that the number of MPAs under the CCAMLR Convention could increase. Following a 2005 workshop on MPAs, the Commission noted there was "a need to develop a strategic approach to MPA design and implementation throughout the Southern Ocean, notably in relation to a system of protected areas…" as well as that "MPAs [have] considerable potential for furthering CCAMLR's objectives…."

CCAMLR decisions are based on consensus, and the lack of support for the concept of MPAs from some member states has slowed the development of an MPA network for the region, according to Jon Nevill, a Ph.D. candidate at the University of Tasmania (Australia) who is researching the Convention. However, he says, the multilateral nature of Antarctic marine management has had benefits as well. "The Antarctic Treaty is underpinned by principles fostering peace, cooperation between nations, and scientific study," he says. "These principles, and the cooperative culture of the Treaty, have tended to spill over to workings of the CCAMLR Commission."

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Research Spotlight Lessons Learned on MPAs, Conservation, and Customary Sea Tenure in the Western Solomon Islands

Shankar Aswani has spent more than a dozen years researching marine ecosystems and coastal communities in the Solomon Islands in the southwestern Pacific. An anthropologist at the University of California at Santa Barbara (US), Aswani is now leading a project to establish a network of community-based MPAs and seasonal no-take zones in the Solomons, to be managed under customary sea tenure in the nation's Western Province. More than 25 MPAs have been designated so far as part of the project, mostly in two lagoons (Roviana and Vonavona). Site selection has been based on a combination of marine and social science and traditional ecological knowledge. In addition to the goal of conservation, the project is working to empower rural communities by establishing long-term business enterprises and infrastructural initiatives such as clinics and schools. The project is funded by Conservation International, the David and Lucile Packard Foundation, the National Science Foundation, the John D. and Catherine T. MacArthur Foundation, and the Pew Charitable Trusts.

Consistent with the lead article in this edition of *MPA News*, the project's approach is one of ecosystem-based management, says Aswani, given the integration of a number of social and biological parameters at various temporal and spatial scales. It builds on his previous research on the ecological, economic, political, and socio-cultural processes that pattern the region.

In light of Aswani's experience with MPAs in the Solomon Islands, *MPA News* asked him what advice he could draw from it. His answer below is an expansion of remarks from his 2004 paper "The value of many small vs. few large marine protected areas in the Western Solomon Islands", co-authored with Richard Hamilton of the University of Otago (New Zealand), and available at http://www.anth.ucsb.edu/faculty/aswani/articles/traditional_bull.pdf.

***MPA News*:** In your research, what lessons have you learned that are most important to your current project to create and consolidate an MPA network in the Western Solomon Islands?

Shankar Aswani: In general, we have learned a number of lessons:

1. In the Western Solomons (and for Melanesia in general), fishery scientists and coastal managers will rarely achieve ecological sustainability and the protection of marine biodiversity unless they seriously consider local forms of sea tenure and their adaptability to introduced management regimes. Our social impact assessment surveys indicate that between 70% and 90% of Roviana and Vonavona lagoon inhabitants approve of the MPA initiatives. Their confidence in the program derives partly from the fact that it includes customary authority and practices. That is, it represents an extension and revitalization of traditional sea tenure practices in ways that the people can relate to and articulate in the local cultural idiom. Indeed, we can raise a number of issues concerning the integration of sea tenure institutions into fisheries co-management policies. These include issues regarding the differences between Western and indigenous forms of knowledge and questions of equity, empowerment, jurisprudence, and conflict resolution among local, state, and international players. However, the absence of any binding and enforceable legislative or regulatory tools in the Solomon Islands necessitates the use of sea tenure as a framework for establishing any form of fisheries regulations.

Note that not all customary sea tenure systems work. In the Roviana region, various historical processes have produced different marine territorial arrangements, and some communities can better manage their marine resources than others. Understanding asymmetries in territorial strategies, therefore, has been important in our selection of MPA sites. It would be pointless to implement a no-take marine reserve in a village — no matter how rich in marine biodiversity — if harvest restriction rules could not be enforced efficiently there.

2. It is unrealistic to expect a community-based conservation project to succeed with only short-term expert guidance and financial support. Solomon Islanders have developmental aspirations that cannot be ignored. Hence, if local communities are to forfeit exploiting their resources, some form of alternative livelihood has to be furnished. While we provide infrastructural assistance to various communities (e.g., clinics and schools) and they contribute free labor and local materials, we believe that continued environmental education is vital if we are to move beyond the capital dependency created by financial incentives as components of conservation projects. There is an issue here of importance. The goodwill generated by small development projects creates *social capital* that cannot be accrued through other means. Communities in the Solomons that have had logging and have seen no public benefits from such operations are beginning to realize that conservation programs can do what capital extraction initiatives have not. While this may not be the best conceptual start in terms of people's attitudes towards marine conservation, it is the right framework to foster socially a conservation ethic among participants, and to have the MPAs readily accepted. Note that "fly-by" approaches, in which short-term develop-

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ment programs are offered in return for MPAs, do not work in this region. Long-term presence is necessary if development is to be used as an incentive for conservation.

3. Outside project leaders and funding agencies have to be prepared to accept that local interest in marine resource management may wax and wane over time, particularly in places like Melanesia. For instance, local peoples may have diverse conceptions of a marine protected area's time horizon, and stakeholders' commitment to protecting a site indefinitely may vary widely. Therefore, MPAs have to be flexible enough to accommodate this attitudinal dynamism. In the Roviana case, for instance, the local resource management committees have determined that opening and closing of parts of their MPAs should follow the ritual cycles of the village (e.g., opening the shell beds for a mortuary feast) rather than relying on biological data (e.g., spawning periodicity of various mollusk species) for determining the management regime. This kind of adaptiveness is seldom found in MPAs designed by science-driven programs implemented by national agencies, which tend to be more inflexible managerially and statutorily.

4. The marine protected areas and their resulting biological outcomes are tangible means of demonstrating the significance of resource management. The witnessing of actual management results, whether real or perceived, is the most effective means of environmental education — i.e., "seeing is believing." Concurrently, the results of scientific monitoring become of critical importance. Scientific results can be a catalyst for reinforcing the local perception that the MPAs are having positive biological results.

5. The participation of local church leaders is of paramount importance. The sanction of our project by the head of the Christian Fellowship Church, whose members hold customary control over huge areas of the Western Solomons, will help to ensure the long-term sustainability of the conservation and development initiatives.

6. It is possible for MPAs to meet their social and biological goals. From the perspective of the social sciences, however, we need to move beyond programmatic statements (e.g., promoting the value of social science for MPA design) and overemphasizing social critique (e.g., deconstructing colonial histories and analyzing NGO discourses and intentions) and take leadership roles by designing stakeholder-driven programs in partnership with natural scientists. These programs should consider not only key biological and ecological parameters but also the characteristics and behaviors of all the stakeholders involved, the desires of different stakeholders, and the stakeholders' knowledge. Only then will we completely realize the true value of social science research in MPA design and implementation. Stated another way, skeptical natural scientists need to "see" theoretically and methodologically informed applied social science in action.

Notes & News

Handbook available on creating MPA boundaries

A new handbook provides best practices for the establishment of MPA boundaries. Offering guidance for conceptualizing and writing boundary descriptions, the 66-page *Marine Managed Areas: Best Practices for Boundary Making* is intended to help reduce boundary misunderstandings and assist the transition from traditional mapping methods to modern, digital techniques based on geographic information systems (GIS). Authored by the (US) Federal Geographic Data Committee's Marine Boundary Working Group and sponsored by the National Marine Protected Areas Center, the book was written with US resource managers in mind, but offers enough general guidance to be useful to practitioners elsewhere. (An essay on boundary-making by one of the handbook's authors, David Stein, appeared in the February 2003 edition of *MPA News* [*MPA News* 4:7].) The free handbook is available at http://www.csc.noaa.gov/products/mb_handbook.

Two publications provide views on protecting underwater cultural heritage

A new book provides sixteen national perspectives on the protection of shipwrecks and other underwater cultural heritage, reflecting passage in 2001 of a UNESCO Convention on this subject (*MPA News* 3:3 and 3:5) and how the framework has affected legal protection over a range of jurisdictions worldwide. *The Protection of the Underwater Cultural Heritage* (Martinus Nijhoff Publishers, 2006), edited by Sarah Dromgoole of the University of Leicester (UK), is the second edition of a volume first published in 1999. In this second edition, half of the national essays are entirely new; most of the rest have been substantially rewritten. The new 420-page book retails for US $176 and is available from Amazon.com and other booksellers.

The International Council on Monuments and Sites (ICOMOS) has released a free report *Underwater Cultural Heritage at Risk: Managing Natural and Human Impacts* that features more than 30 articles on

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the subject, including multiple case studies, reflections on the 2001 UNESCO Convention, and discussions of the role of MPAs in protection. The report's introduction and foreword each appear in three languages (English, French, Spanish); the remainder of the content is in English only. The report is available at http://www.international.icomos.org/risk/2006/fulldocan.pdf.

US releases draft framework for national MPA system; federal MPA advisory committee seeks applicants

In the US, the National Oceanic and Atmospheric Administration (NOAA) and the Department of the Interior have jointly released a draft framework for the development of a national system of MPAs. The draft framework is open for public comment through 14 February 2007. It represents the culmination of several years' work to examine the nation's existing place-based marine conservation efforts, and describes a national system of MPAs built in partnership with federal, state, tribal, and local governments as well as other stakeholders. "The draft framework offers a proposal for working together at regional and national levels to support the effective use of marine protected areas and achieve common goals for conserving the nation's vital marine resources," said Commerce Secretary Carlos Gutierrez and Interior Secretary Dirk Kempthorne in a joint letter to state governors and tribal leaders. The July 2005 edition of *MPA News* featured an article on the process of developing the draft framework ("Developing a National System of MPAs…", *MPA News* 7:1).

The Marine Protected Areas Federal Advisory Committee, which provided extensive input on crafting the draft framework, is seeking new members to fill approximately 15 vacancies for Fall 2007. Nominations for natural and social scientists; state and territorial resource managers; cultural resource experts; and representatives of ocean industry, commercial and recreational fishing, and environmental organizations are due by 1 November 2006.

More information on the draft framework and the Advisory Committee vacancies is available at http://www.mpa.gov.

WWF-Spain proposes national representative system of MPAs

WWF-Spain, an NGO, has proposed creation of a representative network of MPAs for Spain that would encompass 20 sites selected by the organization on the basis of ecological, socioeconomic, and other criteria. The proposed network would contain inshore sites within Spain's 12-nm territorial sea and offshore areas in its 200-nm Exclusive Economic Zone. Upon release of the proposal, Spanish Environment Minister Cristina Narbona praised it as a way to achieve real protection of the nation's marine area. In the coming months, Spain is expected to designate its first offshore MPA, El Cachucho Bank, under the OSPAR Convention. This site is one of the 20 proposed by WWF-Spain, which also include submarine canyons, seagrass meadows, and cold-water coral reefs, among other habitats. Spain already has 38 inshore MPAs under various designations. The report *Conservando nuestros paraísos marinos* is available in Spanish at http://www.wwf.es/red_amp_espana.php.

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Report: MPAs are "indispensable" for addressing climate change in oceans

In an era of global climate change, marine protected areas provide an "indispensable" means of bolstering the resilience of ocean ecosystems and preserving marine biodiversity, according to a new report by the German Advisory Council on Climate Change. The report *The Future Oceans — Warming Up, Rising High, Turning Sour* analyzes the impacts of climate change on coastal and ocean ecosystems, fisheries, and human communities, and offers several detailed policy recommendations, including greater application of MPAs and other ecosystem-based management tools. The report reiterates the target set at the World Parks Congress in 2003 that 20-30% of all marine habitats should receive strict protection in MPAs (*MPA News* 5:4). The publication is available online at *http://www.wbgu.de/wbgu_sn2006_en.pdf*.

MPA Tip: Site selection

MPA News presents a new feature, "MPA Tip", with advice on MPA planning and management gathered from various publications on protected areas. The purpose is two-fold: to provide useful guidance to practitioners, and to serve as a reminder of valuable literature from past years.

The following tip on MPA site selection is from *Guidelines for Marine Protected Areas (*IUCN, 1999), edited by Graeme Kelleher and available online at http://app.iucn.org/dbtw-wpd/edocs/PAG-003.pdf.

Tip: In selecting sites, the conservation needs should be balanced with the needs of local people, who may depend on the sea for their livelihoods.

It is better to create and manage successfully an MPA that may not be ideal in ecological terms, but which achieves the purposes for which it is established, than to labor vainly to create the theoretically "ideal" MPA. Where there is a choice of ecologically suitable areas, as there often is in the sea, the dominant criteria for selection of MPA locations, boundaries, and management systems should be socioeconomic. Where there is no choice, ecological criteria should come first.

In general, not enough weight has been given to socioeconomic criteria in the selection of MPAs, yet these factors will probably determine whether the MPA flourishes or fails. Because community support is absolutely vital to the success of any MPA, MPAs that contribute to economic activity will be far easier to create and manage than those that do not.